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# Case Series: Regional Anaesthesia in Obstetric Patients with Cardiac Disease - Insights and Outcomes in Managing Anesthesia for Cesarean Deliveries

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## INTRODUCTION

Regional anaesthesia has emerged as a vital strategy for managing pain during lower segment cesarean sections (LSCS), particularly in obstetric patients with underlying cardiac disease. Given the complex physiological demands of pregnancy and the unique challenges presented by cardiac conditions, regional techniques, such as spinal and epidural anaesthesia, offer significant advantages over general anaesthesia. These methods can provide effective analgesia while minimizing cardiovascular stress and improving maternal and neonatal outcomes[(1,2)].

Patients with heart disease are at increased risk for perioperative complications, making careful anaesthetic management essential. Regional anaesthesia not only reduces the need for systemic analgesics but also helps maintain hemodynamic stability during the procedure, which is crucial for this high-risk population[(3)]. Studies indicate that regional techniques can lead to lower rates of intraoperative hypotension and reduced postoperative complications in cardiac patients[(4)].

Despite these benefits, the application of regional anaesthesia in patients with cardiac conditions requires thorough preoperative assessment and individualized planning to address potential contraindications and complications[(5)]. This case series aims to provide insights into the use of regional anaesthesia for LSCS in obstetric patients with heart disease, highlighting clinical outcomes and management strategies employed in this unique cohort.

## CASE REPORT 1

### RHD WITH SEVERE MR MILD TR

A 28 yrs old female, weighing 60kg, G2P1L1 with 37wks BD of gestational age, was planned for elective lower segment cesarean section (LSCS) under combined spinal and epidural anaesthesia. The patient is a known case of Rheumatic heart disease with severe mitral regurgitation and mild tricuspid regurgitation, diagnosed 6 years ago during her first pregnancy. Pt is taking oral metoprolol 50mg and furesamide 40mg once daily for the same. General

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examination revealed a pulse rate of 94 per minute with 2-3 missed beats per minute and blood pressure of 124/78 mmHg. On auscultation, a holosystolic murmur is heard at the apex of the heart with radiation to the axilla. Electrocardiogram (ECG) showed 2-3 missed beats per minute. Two dimensional (2D) echo showed RHD, Anterior mitral leaflet tip is thickened and doming, posterior mitral leaflet is fixed with restricted mobility, severe mitral regurgitation with posteriorly directed jet >40% and vena contracta width >0.7 cm, mild TR and left ventricular (LV) ejection fraction 60%. All cardiac medications were continued till the day of surgery. Informed high-risk consent was obtained in view of heart disease. Standard anesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Preloading with 100 ml of Ringer's lactate was done. Combined spinal and epidural anesthesia was chosen due to less hemodynamic perturbations and to extend analgesia in postoperative period. Epidural catheter was inserted at L2–L3 level with loss of resistance technique and kept 4 cm inside the space. Subarachnoid block was given at L3-L4 level with low dose of Inj. Bupivacaine 0.5% (H) 0.8cc and Inj Fentanyl 25mcg using 23G spinal needle. Epidural test dose of 3 cc 2% lignocaine with 15 mcg of adrenaline was given to rule out intrathecal or intravascular placement. Intravenous (IV) midazolam up to 1 mg was given for anxiolysis. Intraoperative period was uneventful. Haemodynamioc stability was maintained with pulse rate of 80-100/min. After delivery, injection furosemide 20mg was given. The procedure lasted for 60 min with blood loss of 500 ml which was replaced with colloid. The patient was monitored in critical care unitfor 24 hours and analgesic doses of local anesthetic and opioid were continued postoperatively.

**CASE REPORT 2**

**RHD WITH MODERATE MR AND MILD MS**

A 21 yrs old female, weighing 64kg, a diagnosed case of primigravida with 37wks BD of gestational age, was planned for elective lower segment cesarean section (LSCS) under low-dose spinal anaesthesia. The patient is a known case of Rheumatic heart disease with moderate mitral regurgitation and mild mitral stenosis, diagnosed 8 years ago. Patient is taking oral propranolol 40mg and flunarizine 10mg twice daily for the same. Patient is also diagnosed with hypothyroidism 3 months back for which she is taking tablet thyroxine 12.5 mcg once daily. Her present TSH is 1.25 uIU/mL. Patient is recently diagnosed with gestational hypertension 3 weeks back and started on tablet labetalol 200mg thrice daily and tablet nifedipine 10 mg twice a day. General examination revealed a pulse rate of 98 per minute and blood pressure of 114/72 mmHg. On auscultation, a holosystolic murmur is heard at the apex of the heart with radiation to the axilla. Electrocardiogram (ECG) showed normal sinus rhythm with Q wave in lead III and aVF. Two dimensional (2D) echo showed RHD, Anterior mitral leaflet tip is thickened and doming, posterior mitral leaflet is fixed with restricted mobility. Mitral valve area is 2-2.1cmsq. Anterior mitral leaflet tip prolapsing into left atrium causing moderate mitral regurgitation with posteriorly directed jet of 20% and vena contracta width 0.5cm. Left ventricular (LV) ejection fraction is 60%. All cardiac medications were continued till the day of surgery. Informed high-risk consent was obtained in view of heart disease. Standard anaesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Preloading with 100 ml of Ringer's lactate was done. Low dose Subarachnoid block was chosen as anaesthesia of choice. Subarachnoid block was given at L3-L4 level with Inj. Bupivacaine 0.5% (H) 1.3cc and Inj Fentanyl 25mcg using 25G spinal needle. Maximum sensory level upto T6 was achieved within 5 mins. Motor blockade Bromoage scale 2

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was attained within 8 mins. Two-segment regression happened within 45 minutes. Intraoperative vitals are well maintained. After delivery, injection furosemide 20mg was given. The procedure lasted for 45 min with blood loss of 500 ml which was replaced with 350ml of crystalloid. The patient was monitored in critical care unit, and analgesic doses of local anesthetic and opioid were continued postoperatively.

**CASE REPORT 3**

**SEVERE VALVULAR PS WITH MILD MR, AR AND MOD TR**

A 23 yrs old female, weighing 58kg, primigravida with 38wks BD of gestational age, was planned for emergency lower segment cesarean section (LSCS) under low-dose spinal anaesthesia. The patient is a known case of severe valvular pulmonary stenosis, diagnosed at the age of 8 years. General examination revealed a pulse rate of 88 per minute, blood pressure of 140/82 mmHg and oxygen saturation of 98% on room air. On auscultation, ejection systolic murmur, grade IV is heard at pulmonary area. Electrocardiogram (ECG) showed normal sinus rhythm with right axis deviation. T wave inversion in V1-V6, lead II, III, aVF with bi-ventricular hypertrophy. Screening two dimensional (2D) echo showed severe valvular pulmonary stenosis with a pulmonary jet velocity of 3m/sec, maximum pulmonary gradient -130mmHg and a mean pulmonary gradient of 64mmHg. There was mild mitral regurgitation, mild aortic regurgitation (AIPHT - 560 m sec) and moderate tricuspid regurgitation with tricuspid regurgitant jet velocity of 5.2m/sec. The left ventricular ejection fraction was 60% and right ventricular systolic function was normal. The patient belonged to NYHA class II and modified WHO class II-III. Patient was taken for emergency LSCS under low-dose spinal anaesthesia with informed high-risk consent. Standard anaesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Two 18 G cannula secured. Co-hydration with Ringer's lactate and noradrenaline infusion was started. The goal was to maintain right ventricular filling pressures and optimise myocardial contractility. Low-dose subarachnoid block was given at L3-L4 level with Inj. Bupivacaine 0.5% (H) 1.2cc and Inj. Fentanyl 25mcg using 23G spinal needle. Maximum sensory level upto T6 was achieved within 5 mins. After delivery, injection furosemide 20mg was given to prevent an increase in RV preload due to auto transfusion. The procedure lasted for 40 min. Total input was 200ml, blood loss was 500 ml and urine output was 100 ml. The patient was monitored in critical care unit, and paracetamol was given for postoperative analgesia.

**CASE REPORT 4**

**TAKAYASU ARTERITIS WITH LVEF 35% MVP WITH SEVERE MR**

A 21 yrs. old female, weighing 62kg, primigravida with 36wks. BD of gestational age, was planned for emergency lower segment cesarean section (LSCS) under epidural anaesthesia. The patient is a known case of takayasu arteritis type III, diagnosed at the age of 8 years. A detailed cardiovascular evaluation, including a review of angiography recorded for unexplained tachycardia and breathlessness, revealed cardiomegaly with left ventricular thickening and dilatation of left atrium. There was thickening of wall of distal aortic arch, thoracic and abdominal aorta suggestive of aortoarteritis and complete stenosis of ostioproximal segment of superior mesenteric artery. Patient was diagnosed as Type III Takayasu arteritis. She underwent percutaneous balloon angioplasty for mid aortal narrowing. She was on Tab carvedilol 3.125mg OD, Tab dioxin 0.5mg OD, Tab amlodipine 5mg OD, Tab losartan 500mg OD, Tab furosemide 20mg OD. On general examination pulse rate was 94 per minute, regular in rhythm, all

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peripheral pulses were palpable. Blood pressure was recorded as 136/84mmHg and 140/86 mmHg in the upper and lower limbs, respectively and oxygen saturation of 98% on room air. On auscultation, holosystolic murmur is heard at the apex of the heart with radiation to the axilla. Electrocardiogram (ECG) showed normal sinus rhythm. Two dimensional (2D) echo findings were known case of takayasu arteritis with percutaneous old balloon angioplasty to mid aorta. Global left ventricular hypokinesia with left ventricular ejection fraction of 35%. Mitral valve prolapse with anterior mitral leaflet tip prolapsing into left atrium causing severe mitral regurgitation with posteriorly directed jet >40% and vena contracta width >0.7 cm. Narrowing noted in thoracic aorta with pressure gradient of 11 mmHg with continuous diastolic flow. Patient is taking tab nicardia 20mg BD and tab lasix 20 mg OD at present.Patient was taken for emergency LSCS with informed high risk consent. Standard anaesthesia monitoring was done with ECG with STsegment analysis, noninvasive blood pressure monitored in both upper and lower limb, pulse oximeter probe placed on right upper limb, temperature and urine output was monitored. Two 18 G cannula was secured. Preoperative Inj hydrocortisone 100mg was administered IV to prevent Addisonian hypotensive crisis. The patient was preloaded with intravenous crystalloid. Epidural catheter was inserted at L2–L3 level with loss of resistance technique and kept 4 cm inside the space. Epidural test dose of 3 cc 2% lignocaine with 15 mcg of adrenaline was given to rule out intrathecal or intravascular placement. After giving 1mg midazolam, right jugular cannulation was performed. Graded doses of local anesthetic with inj.Bupivaicaine 0.5% 4cc and inj.2% Lignocaine 4cc was given to achieve senaory level of T6 in15-20 mins. The goal was to maintain blood pressure, avoid fluid overload by giving CVP guided fluid and clinical neurological monitoring.Intra-operative there was 1 episode of hypotension and so, Inj.Noradrenaline 4mg was started at 3cc/hour.The surgical time was 45 mins and the blood loss was 500 ml. Total fluid of 250ml was given according to CVP and Urine output. Inj Lasix 10 mg was given and urine output of 200ml was achieved.The intraoperative period was uneventful and patient was shifted to critical care unit for monitoring. Post-operative fluid management was done with 30cc/hour of crystalloid.Inj Nor -adrenaline was conyinued post-operatively for 4 hours and then stopped gradually.Analgesic doses of local anesthetic and opioid were continued postoperatively.

**CASE REPORT 5**

**CHD WITH ASD WITH SEVERE TR AND MOD PAH**

A 27 yrs old female, weighing 68kg, G2A1 with 36wks BD of gestational age with preeclampsia was planned for emergency lower segment cesarean section (LSCS) under epidural anaesthesia. The patient is a known case of congenital heart disease with atrial septal defect. General examination revealed a pulse rate of 86 per minute, blood pressure of 140/82 mmHg and oxygen saturation of 98% on room air. On auscultation, pansystolic murmur is heard in the parasternal region. Electrocardiogram (ECG) showed normal sinus rhythm with right axis deviation. T wave inversion in V1-V6, lead II, III, aVF with bi-ventricular hypertrophy. Two dimensional (2D) echo showed congenital heart disease with atrial septal defect with left to right shunt. There was severe tricuspid regurgitation with central jet >50% and vena contract >0.7cm and moderate pulmonary artery hypertension (Pulmonary arterial systolic pressure by TR jet = 45mmHg). The left ventricular ejection fraction was 60% and right ventricular systolic function was normal. Patient was taken for emergency LSCS under epidural anaesthesia with informed high-risk consent. Standard anaesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Two 18 G cannula

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secured. The patient was preloaded with intravenous crystalloid. Epidural catheter was inserted at L2–L3 level with loss of resistance technique and kept 4 cm inside the space. Epidural test dose of 3 cc 2% lignocaine with 15 mcg of adrenaline was given to rule out intrathecal or intravascular placement. Sensory levelat T6 was achieved with graded doses of local anesthetics with 4cc of 0.5% bupivacaine, 50mcg fentanyl and 3cc of 2% lignocaine within 15-20 min.The goal was to prevent hypoxia, hypercarbia and acidosis to avoid increase in pulmonary vascular resistance (PVR) and reversal of shunt. The surgical time was 45 mins and the blood loss was 600 ml.Total 400ml of intravenous fluid with crystalloid was given.Inj Furesemide 10mg was given.Urine output of 400ml was recorded.The intraoperative period was uneventful and patient was shifted to critical care unit for monitoring.Post-operative analgesia was maintained with opioids and local anesthetics.

**CASE REPORT 6**

**CHD WITH O/C/O TOF WITH VSD PATCH INSITU WITH SEVERE PS AND MOD PR. 60% LVEF WITH RV DYSFUNCTION**

A 29 yrs. old female, weighing 62kg, primigravida with 36wks BD of gestational age was planned for emergency lower segment cesarean section (LSCS) under epidural anaesthesia. Patient was diagnosed as a case of congenital heart disease with Tetralogy of fallot at the age of 5 years. Patient had complaint of dyspnea on exertion NYHA grade III, cyanosis and history of recurrent respiratory tract infection. On detailed cardiovascular evaluation, 2D echo revealed sub aortic ventricular septal defect with 50% aortic override and right to left shunt, moderate infundibular pulmonary stenosis. All valves normal and left ventricular ejection fraction of 55%. She underwent Transventricular Intracardiac repair with pulmonary valvotomy of TOF with patent foramen ovale. General examination revealed a pulse rate of 96 per minute, blood pressure of 114/82 mmHg and oxygen saturation of 98% on room air. On auscultation, pansystolic murmur is heard. Electrocardiogram (ECG) showed sinus tachycardia with right axis deviation. T wave inversion in V1-V4 with right ventricular hypertrophy. Two dimensional (2D) echo showed Tetralogy of fallot repair with VSD patch in situ (no flow demonstrated across it). Right ventricle and ascending aorta dilated (diameter = 35mm). There was severe pulmonary stenosis with pressure gradient of 114mmHg and moderate pulmonary regurgitation. The left ventricular ejection fraction was 60% and right ventricular systolic dysfunction (TAPSE= 15mm). Patient was taken for emergency LSCS under epidural anaesthesia with informed high risk consent. Standard anaesthesia monitoring was done with ECG with ST segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output.Pre-operative vitals of the patient were as, pulse rate of 104/min, blood pressure of 110/70mmhg, spo2 of 98%. Two 18 G cannula secured. The patient was preloaded with intravenous crystalloid 100ml. Epidural catheter was inserted at L2–L3 level with loss of resistance technique and kept 4 cm inside the space. Epidural test dose of 3 cc 2% lignocaine with 15 mcg of adrenaline was given to rule out intrathecal or intravascular placement. Sensory level was achieved with graded doses of local anaesthetics with 2% Lignocaine and 0.5% Bupivaicaine and Inj. Fentanyl. T6 was achieved with total 4cc of 0.5% bupivacaine, 50mcg fentanyl and 3cc of 2% lignocaine in 15-20 mins , given gradually. Further top up was given according to hemodynamics with 2cc of 0.5% bupivacaine. After delivery, injection furosemide 20mg was given to prevent an increase in RV preload due to auto transfusion. The procedure lasted for 40 min. Total input was 300ml, blood loss was 500 ml and urine output was 250 ml. The patient was monitored in critical care unit, and local anesthetic and opioids were given for postoperative analgesia.

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**CASE REPORT 7**
**RHD WITH MODERATE MS AND MILD MR TR**

A 32 yrs old female, weighing 72kg, G2P1 with 37wks BD of gestational age, was planned for elective lower segment cesarean section (LSCS). The patient was recently diagnosed as a case of Rheumatic heart disease with moderate mitral stenosis. Patient was on Tab Metoprolol 25mg twice daily and Tab Aspirin 75mg once a day for the same. Patient was also diagnosed with preeclampsia and gestational diabetes mellitus in 8th month of pregnancy. She was started on Tab Labetalol 200mg thrice a day and Tab Nicardia 20mg thrice daily for hypertension. She was taking Inj Actrapid 6U before breakfast and 6U before dinner for diabetes. Her General examination revealed a pulse rate of 77 per minute and blood pressure of 140/90 mmHg. On auscultation, a holosystolic murmur is heard at the apex of the heart with radiation to the axilla. Electrocardiogram (ECG) showed normal sinus rhythm with P pulmonale in lead II. Two dimensional (2D) echo showed RHD, Anterior mitral leaflet tip is thickened and doming, posterior mitral leaflet is fixed with restricted mobility. Mitral valve area is 1.7-1.8cmsq. There was mild mitral regurgitation and mild tricuspid regurgitation. Left ventricular (LV) ejection fraction is 60%. All medications were continued till the day of surgery. Informed high-risk consent was obtained in view of heart disease. Standard anaesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Preloading with 100 ml of Ringer's lactate was done. Low-dose subarachnoid block was given at L3-L4 level with Inj. Bupivacaine 0.5% (H) 0.8cc and Inj Fentanyl 25mcg using 23G spinal needle. Maximum sensory level upto T6 was achieved. Intraoperative vitals are well maintained and was uneventful. Total input was 300 ml, blood loss was 500 ml and urine output was 350ml. The patient was monitored in critical care unit for 24 hours.Post-operative urine output , vitals were maintained. Fluid was given at the rate of 40cc/hour.Analgesia with paracetamol and with opiod asv required was maintained.

**CASE REPORT 8**
**H/O ASD PATCH REPAIR**

A 32 yrs old female, weighing 60kg, G4P1A2 with 37wks BD of gestational age, was planned for elective lower segment cesarean section (LSCS). Patient had complaint of epistaxis and recurrent infections 16yrs back for which she was evaluated. She was diagnosed with Atrial Septal Defect and underwent Atrial Septal Defect patch repair. General examination revealed a pulse rate of 94 per minute, blood pressure of 110/78 mmHg and oxygen saturation of 98%. Electrocardiogram (ECG) showed normal sinus rhythm. Two dimensional (2D) echo showed ASD patch in situ with left ventricular (LV) ejection fraction of 60% and mild tricuspid regurgitation. Informed high-risk consent was obtained in view of heart disease. Standard anesthesia monitoring was done with ECG with ST-segment analysis, noninvasive blood pressure, pulse oximetry, temperature, and urine output. Preloading with 100 ml of Ringer's lactate was done. Low dose spinal anesthesia was chosen due to less hemodynamic perturbations. Subarachnoid block was given at L3-L4 level with Inj. Bupivacaine 0.5% (H) 1.5cc and Inj Fentanyl 25mcg using 23G spinal needle. In intraoperative period, there is one episode of hypotension managed by 6mg Inj Mephenteramine. The procedure lasted for 60 min with blood loss of 500 ml which was replaced with crystalloid 400ml and colloid 100ml. The patient was monitored in critical care unit for 24 hours and opioid were given postoperatively for analgesia.

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## DISCUSSION

Our case series highlights several key findings regarding the efficacy and safety of regional anaesthesia in this high-risk population. Patients demonstrated favorable outcomes, with a low incidence of intraoperative complications such as hypotension,arrhythmias or maternal collapse intraoperatively. The use of regional anaesthesia facilitated smoother procedures, often resulting in quicker recovery times and shorter hospital stays[3]. Additionally, the ability to maintain maternal awareness during surgery contributed positively to the overall birth experience.

Individualized assessment and multidisciplinary collaboration were critical in managing these cases. Comprehensive preoperative evaluations helped identify potential risks and contraindications, allowing for tailored anaesthetic plans[5]. The anaesthesia team's expertise in monitoring hemodynamic parameters was crucial in ensuring patient stability throughout the procedure.

Despite the benefits, challenges remain. Some patients exhibited contraindications to regional techniques, necessitating careful consideration and planning. The potential for complications, such as epidural hematoma or infection, underscores the need for vigilance and preparedness[4]. Our findings suggest that, when carefully selected and monitored, regional anaesthesia can be a safe and effective option for obstetric patients with heart disease undergoing LSCS.

## CONCLUSION

In conclusion, this case series demonstrates that regional anaesthesia is a viable and beneficial approach for obstetric patients with cardiac disease undergoing LSCS. By optimizing maternal and neonatal outcomes while minimizing perioperative risks, regional techniques significantly enhance the safety and efficacy of the surgical process. The findings underscore the importance of individualized anaesthetic planning and multidisciplinary collaboration in managing these complex cases. Future studies with larger cohorts are essential to further validate these findings and refine protocols for anaesthetic management in this vulnerable population.

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